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tually employed in critical investigations which terminate in experimental verifications. Why not begin, then, at this point?

We are trying to know knowledge. The implication assuredly is that there is knowledge. The procedure which I have tried to follow, no matter with what obscurity and confusion, is to begin with cases of knowledge and to analyze them to discover why and how they are knowledges. If this procedure can be successfully undertaken, then we can tell what knowledge is. What other method is reasonable? We are trying, be it remembered, to know knowledge, to get at and formulate its character. What is the likelihood of success in the undertaking if we rule out specific cases of knowledge and try to investigate knowledge at large? If we have no case of knowledge upon which to go, and upon which to base judgments as to the value of a proferred knowledge of knowledge, what meaning has the term knowledge? Why not call it abracadabra, or splish-splosh, or anything else that comes into your head? How does knowledge, at the best, mean something different from poesy or fancy or dreams? For my part if we wish to know what a faithful report of the world in which we live means, I prefer to take the best authenticated cases of faithful reports which are available, compare them with the sufficiently numerous cases of reports ascertained to be unfaithful and doubtful, and see what we find. Starting in this way, we have a method by which we can also discriminate and identify poesy, reverie, dreams, sensations, ideas, hypotheses, data, and all the rest of it. The principle of parsimony has claims which all tell in behalf of the use of the logical method.

JOHN DEWEY.

COLUMBIA UNIVERSITY.

BOOK REVIEWS

The Absolute Relations of Time and Space. ALFRED A. ROBB. Cambridge University Press. 1921. Pp. viii + 80.

This little book is a simplified summary of the author's earlier work, *A Theory of Time and Space.* It amounts, I should say, to a restatement of the special theory of relativity, in which an attempt is made, first, to avoid paradox as far as possible, and secondly, to reduce all the geometrical concepts involved to a single undefined relation. In the former respect, the success of the work may be doubted; in the latter respect its success is altogether brilliant.

Mr. Robb is one of those who has revolted against the notion that what is the earlier of two events for one observer can be—and not

merely seem to be—the later of the two for another observer. This seems to him to make the relation of before and after merely subjective, whereas science requires that it be objective. The objection appears to me to be unsound, for it leaves out of account the fact that the difference in the temporal relations of the two observers is supposed, according to the theory criticized, to have a perfectly definite objective basis. And, on examination, the difference between Einstein and our author shows itself to be merely verbal. All the complexity of multitudinous time-systems which Einstein recognizes appears again here under the veil of a new terminology.

Mr. Robb's starting-point is the assumption that for an event A to be earlier than an event B, it must be possible for A to be among the causal antecedents of B; that is to say, it must be possible for a physical influence starting from A to reach the place of B not later than B. If now we suppose that there is a maximum speed with which energy can be transmitted—the velocity of light—and if we compare events at two different points in space, there will be at either point a time-interval within which the events will be neither earlier nor later than a given instantaneous event at the other point. As the distance increases, the time-interval increases also. The whole period of the Great War may be neither earlier nor later than a given event on Sirius. Contrariwise, as what we may call the "neutral interval" varies, the distance must vary. Thus spatio-temporal relations exhibit a sort of "conical order." Now it is only when, according to Einstein, A precedes B in *all* time-systems, that, according to Mr. Robb, A is said to precede B. Thus a certain amount of paradox is avoided. But an equal paradox is substituted. We are not to speak of the *same* instant as occurring throughout the universe. Each instant is restricted to a certain point of space. Is anything gained for science or common sense?

But if Mr. Robb's terminology is not less paradoxical than Einstein's, it is equally legitimate; and it leads to the brilliant piece of logical analysis which I have mentioned. The fact that each time-interval is correlative with a certain distance enables Mr. Robb to provide a set of definitions of geometrical concepts in terms of the relations of before and after. In Mr. Robb's own words, "*spatial relations are to be regarded as the manifestation of the fact that the elements of time form a system in conical order.*" It is not easy to do justice to the ingenuity with which this analysis is conceived; and it is safe to say that the subject is given a clearing-up which no other mode of treatment could well surpass.

THEODORE DE LAGUNA.

BRYN MAWR COLLEGE.